
NAVFAC IGS-14240 (JUNE 2003)

Supersedes IGS-14240 (05/02)
Preparing Activity: LANTNAVFACENGCOM Based on UFGS-14240N

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 14240

HYDRAULIC ELEVATORS
06/03

NOTE: This guide specification is issued by the
Atlantic Division, Naval Facilities Engineering
Command for regional use in Italy.

NOTE: This guide specification covers hydraulic
passenger and freight elevators.

NOTE: All Navy facility designs which include
elevators shall comply with the "NAVFAC Elevator
Design Guide" located on the NAVFAC Criteria Home
page at the WEB address
<http://www.efdlant.navfac.navy.mil/lantops-15/home.htm>
under Interim Technical Guidance.

NOTE: Any editing of non-bracketed paragraphs shall
be approved through the NAVFAC Elevator Program.

NOTE: Comments and suggestion on this specification
are welcome and should be directed to the technical
proponent of the specification. A listing of the
technical proponents, including their organization
designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer
choices or locations where text must be supplied by
the designer.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

FEDERAL GOVERNMENT ACCESSIBILITY STANDARDS

UFAS (1984) Uniform Federal Accessibility Standards

COMMITTEE FOR THE STANDARDIZATION OF EUROPE (CEN)

EN 81-2 (1999 and all amendments) Safety Rules for Construction and Installation of Lifts - Part 2: Hydraulic Lifts

PREN 81-8 (1997) Safety Rules for the Construction and Installation of Lifts - Part 8: Lift landing Doors - Fire Resistance Testing

PREN 81-11 (1998) Safety Rules for the Construction and Installation of Lifts - Part II: New Lifts in Existing Buildings

EN 287-1 (1992) Approval Testing of Welders for Fusion Welding Part 1: Steels

PREN 1418 (1994) Welding Personnel - Approval Testing of Welding Personnel for Fully Mechanical and Automatic Welding of Metallic Materials

PREN ISO 9239-1 (1998) Reaction to Fire Tests for Floor Coverings Determination of the Burning Behavior Using Radiant Heat Ignition Source

PREN 12385-5 (1999) Steel Wire Ropes - Safety Part 5: Standard Ropes for Lifts

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 6925 (1982) Textile Floor Coverings - Burning Behavior - Tablet Test at Ambient Temperature

ITALIAN ELECTROTECHNICAL COMMITTEE (CEI) PUBLICATIONS

CEI 20-25 Flexible Plate Cables PVC Shielded, for Elevators

CEI 64-8	Electrical Systems with Rated Voltages Not Greater Than 1000 v.a.c and 1500 v.d.o
CEI EN 60034-1	(1996 W Amend) Rotating Electrical Machines (CEI 2-3)
CEI EN 60947-4-1	(1997) Low Voltage Equipment. Part 4. Contractors and Starters. Section 1. Electromechanical Contractors and Starters

ITALIAN MATERIALS STANDARD

UNEL Table 73659	Flexible Plate Cables PVC Shielded, for Elevators
DLGS 626/96	(1996) European Mark of Quality (CE) for Electrical Materials

ITALIAN PUBLICATIONS

D.P.R. No. 236	(28 May 1979) Security Measures for Dumbwaiters and Hydraulic Elevators
D.L. No. 390	(30 June 1982) Discipline of the Preventive and Certification Function of the Local Health Authorities and I.S.P.E.S.L.
D.L. Law 12 No. 597	(12 Aug 1982) Discipline of the Preventive and Certification Function of the Local Health Authorities and I.S.P.E.S.L.

ENTE NAZIONALE ITALIANO DI UNIFICAZIONE (UNI)

UNI 9723	(1996) Fire Resistance of Doors and Locking Devices - Test Methods and Classification Criteria
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1.2 SUBMITTALS

NOTE:

Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's

Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Submit the following in accordance with Section 01330, "Submittal Procedures." Refer to paragraph entitled "Quality Assurance" for further description of shop drawing submittal requirements.

SD-02 Shop Drawings

Elevator and accessories; G

Supporting systems; G

Machinery and controls; G

Wiring diagrams; G

Sequence of operations; G

SD-03 Product Data

Elevator and accessories; G

Elevator supporting systems; G

Data sheets; G

Maintenance and diagnostic tools; G

Logic control; G

Hoistway door closing force

SD-05 Design Data

NOTE: confirm during shop drawing approval that the HVAC designed for the elevator machine room is adequate to cool the manufacturer's anticipated heat

loads.

- a. Building Reaction loads; G
- b. Heat loads; G
- c. Car Frame and Platform
- d. Hydraulic Cylinder Piston
- e. Seismic Loads

SD-07 Certificates

Welders' qualifications; G

SD-10 Operations and Maintenance Data

Elevator, Data Package; G

Maintenance and repair action plan; G

Submit data package in accordance with Section 01781, "Operation and Maintenance Data."

1.3 QUALITY ASSURANCE

1.3.1 Shop Drawing Submittal Requirements

Show assembly and arrangement of elevators, accessories, and supporting systems. Show location of machinery and controls in machine room. Provide details for materials and equipment, including operating and signal fixtures, doors, door and car frames, car enclosure, controllers, motors, guide rails and brackets, layout of hoistway in plan and elevation, and other layout information and clearance dimensions. Submit complete wiring diagrams and sequence of operations, showing electrical connections and functions of elevator systems, for machine room, hall, and hoistway area. Submit one set of wiring diagrams in plastic glass cover, framed and mounted in elevator machine room. Deliver other sets to Contracting Officer. Coded diagrams are not acceptable unless adequately identified.

1.3.2 Product Data Submittal Requirements

Include information on motor, pump, gages, piston and cylinder, piping and valves, hall station, and buffer on elevators and accessories. For elevator supporting systems, include information on car control [and emergency power] systems. On data sheets, provide document identification number or bulletin number, published or copyrighted prior to the date of contract bid opening.

NOTE: Choose the bracketed option in next six paragraphs to obtain registered engineers for jobs

in Italy.

1.3.3 Building Reaction Load Submittal Data Requirements

Provide calculations to Contracting Officer for reaction loads imposed on building by elevator system. Provide calculations certified by licensed Structural Engineer [registered on the appropriate rolls of Italy]. Do not fabricate materials nor perform construction until approved by Contracting Officer.

1.3.4 Head Load Data Submittal Requirements

Provide manufacturer's calculations for total anticipated heat loads generated by all the elevator machine room equipment. Provide calculations certified by licensed Mechanical Engineer [registered on the appropriate rolls of Italy]. Do not fabricate materials nor perform construction until approved by the Contracting Officer.

1.3.5 Elevator Car Frame and Platform Calculation Submittal Requirements

Provide calculations to the Contracting Officer to prove that the structure of the Car Frame and Platform will withstand the forces imposed upon it and shall not exceed the maximum allowable stresses and deflections stated in this specification. Provide calculations certified by licensed Structural Engineer [registered on the appropriate rolls of Italy]. Do not fabricate materials nor perform construction until approved by the Contracting Officer.

1.3.6 Hydraulic Cylinder Piston Calculation Submittal Requirements

Provide calculations to the Contracting Officer to prove that the Hydraulic elevator Drive System meets the requirements of this specification for rated load, rated speed and maximum allowable working pressure. Provide calculations certified by a licensed Mechanical Engineer [registered on the appropriate roles of Italy]. Do not fabricate materials nor perform construction until approved by the Contracting Officer.

1.3.7 Seismic Load Submittal Requirements

Provide calculations to the Contracting Officer that prove that all components of the elevator have been designed in accordance with the specification requirements. Provide calculations certified by a licensed Structural Engineer [registered on the appropriate roles of Italy].

1.3.8 Welders Qualifications Submittal Requirements

Comply with PREN 1418, EN 287-1. Include certified copies of welders' qualifications. List welders' name with corresponding code marks to identify each welder's work.

1.3.9 Maintenance and Repair Action Plan Submittal Requirements

Provide plan of action by the Elevator Installation Contactor to provide

emergency and routine maintenance in accordance with paragraph entitled "New Installation Services". In addition to data package "SD-19, Operations and Maintenance Manuals", provide a phone number list, personnel contacts, and all tools to be provided to the Contracting Officer.

1.3.10 Qualification

Provide pre-engineered elevator system by manufacturer regularly engaged in the manufacture of elevator systems. Manufacturer shall either install elevator system or shall provide letter of endorsement certifying that installer is acceptable to manufacturer. Installer is required to be regularly engaged in installation and maintenance of elevator systems.

1.3.11 Inspection, Testing and Certification

Inspection, testing, and certification must be performed by a NAVFAC Certified Elevator Inspector.

1.3.12 Definitions

1.3.12.1 Authority Having Jurisdiction

The organization, office, or individual responsible for approving equipment. Where compliance with the Code has been mandated by law or by this specification, the "authority having jurisdiction" is the U.S. Government and the Host Nation Department or individual so designated in the enacting administrative regulation.

1.3.12.2 Car Platform

The structure which forms the floor of the car and which directly supports the load.

1.3.12.3 Car Frame

The supporting structure to which the car platform, upper and lower sets of guide shoes, car safety, and the hoisting ropes or hoisting-rope sheaves, or the plunger or cylinder of a direct-acting hydraulic elevator are attached.

1.3.12.4 Phase I Emergency Recall Operation

The operation of an elevator wherein it is automatically or manually recalled to a specific landing and removed from normal service because of activation of Firefighters' Service.

1.3.12.5 Phase II Emergency In-Car Operation

The operation of an elevator by firefighters or other emergency personnel where the operation of the elevator is controlled within the cab.

1.4 NEW INSTALLATION SERVICE

NOTE: If elevator is located in remote location,
confirm the necessity for the 1 hour response time
required below with activity.

NOTE: Include EN 81-11 for new elevators in
existing buildings.

Provide routine warranty service in accord with manufacturer's warranty requirements, for period of [12] [_____] months after date of acceptance by Contracting Officer. [Perform work during regular working hours]. Include 24-hour emergency service, with 1 hour response time, during this period without additional cost to Government. Include adjustments, greasing, oiling, and cleaning. Provide routine inspection and tests of elevators in accordance with EN 81-2 [,PREN 81-11] and D.L. No. 390 and D.L. Law 12 No. 597. Provide supplies and parts to keep elevator system in operation. Perform service only by factory trained personnel.

1.4.1 Special Operations

Every six months, test systems for [Emergency Power Operation,]
[Earthquake Emergency Operations,] [Hospital Emergency Commandeering
Service Operations][and] Firefighters' Service. Schedule to not interfere
with building operations. For Firefighters' Service, test monthly.
Deliver written results of each test operation to the Contracting Officers.

1.4.2 Documentation

Document all inspection and testing. Maintain copy of documentation in
machine room.

1.4.3 Maintenance and Diagnostic Tools

Provide all special tools and software necessary to service and maintain
each elevator; deliver at time of final acceptance. Provide one of each
tool per group of elevators. Include solid state or microprocessor
diagnostic tools unavailable on the open market. Provide necessary
diagnostic software in cases where the solid state or microprocessor
diagnostic tools are available on the open market.

1.4.4 Keys for Elevator Key Switches

Provide minimum of twelve keys per unique cylinder used on all key switches
for single elevator. If more than one elevator, additional keys not
required unless there are additional unique cylinders. Keys shall be
provided with brass or fiberglass tags marked 'PROPERTY OF THE U. S.
GOVERNMENT' on one side with function of key or approved code number on
other side.

1.5 FIRE PROTECTION SYSTEM

Division 13, Section [13852, "Interior Fire Alarm System";] Additional fire
protection requirements are found in [Section 13854, "Addressable Interior

Fire Alarm System";] Section 13930, "Wet Pipe Sprinkler System"; and Division 16, Section 16402, "Interior Distribution System".

1.6 SEISMIC RESTRAINT

Provide upper and lower seismic car restraint at all four roller guide assemblies.

PART 2 PRODUCTS

2.1 ELEVATOR DESCRIPTION

NOTE: Indicate elevator performance in paragraphs below.

NOTE: Include PREN 81-11 for new elevators in existing buildings.

Provide elevator system that complies with EN 81-2 [,PREN 81-11] in [its][their] entirety and their normative references, and additional requirements specified herein.

2.1.1 Passenger Elevators

- a. Rated Load: [_____] kilograms (kg)
- b. Rated Speed: [_____] meters per second (mps)
- c. Travel Length: [_____] meters (m)
- d. Number of Stops: [_____]
- e. Number of Hoist Way Openings: [_____] Front; [_____] Rear

NOTE: Provide all elevators of size to accommodate handicapped access as a minimum. For all buildings of four stories or more in height, provide at least one elevator of size to accommodate emergency medical access by a medical gurney.

- f. Car Inside Dimensions: [_____] mm wide, [_____] mm deep and [_____] mm high

NOTE: For car door opening of passenger and service elevators, 1065 mm is standard, except with 1800 kg passenger cars, use 1200 mm. For special purposes, 1525 mm opening may be used.

g. Car Door Opening: [_____] mm wide and [_____] mm high.

NOTE: Use two speed center opening option restrictively for elevators where larger door opening is needed and hoistway space is not available for single-speed. Otherwise, use single-speed side slide, single-speed center opening, or two-speed side slide.

h. Car Door Types: [Single-speed side slide] [Single-speed center opening] [Two-speed side slide] [Two-speed center opening] Horizontal sliding.

2.1.1.1 Cab Enclosures and Door Finishes

NOTE: Indicate finish colors of elevator materials in finish schedule on drawings.

NOTE: Use stainless steel side panels and wall trim in hospital cars.

Provide finishes [as indicated.][as listed below:

a. Floor; [carpet][vinyl composition tile][vinyl sheet tile][____].

b. Walls; [prefinished steel panels][laminated plastic][stainless steel][____].

Wall trim; [prefinished steel][stainless steel][____].

Accessories; [hand rails][____].

c. Interior face of door(s); [prefinished steel panels][stainless steel][____].

d. Ceilings; [supported][prefinished steel panels][anodized aluminum][eggcrate][____].

Ceiling frame; [prefinished steel][stainless steel][anodized aluminum][____].

2.1.1.2 Hoistway Doors and Frame Finishes

Provide finishes on exterior of hoistway as follows:

a. Frame; [prefinished steel][stainless steel][____].

b. Exterior face of door; [prefinished steel][stainless steel][____].

[2..2 Freight Elevators

- a. Rated Load: [_____] kg
- b. Rated Speed: [_____] mps
- c. Travel Length: [_____] m
- d. Number of Stops: [_____]
- e. Number of Hoist Way Openings: [_____] Front Rear [_____]
- f. Car Inside Dimensions: [_____] mm wide, [_____] mm deep and [_____] mm high
- g. Hoistway Door Type & Size: [Manual] [Power Operated] Vertical [Bi-Parting] [Rising] [_____] mm wide and [_____] mm high
- h. Car Gate Type: [Manual] [Power Operated] Vertical rising

NOTE:

- i. Loading Type: [General Freight] [Motor vehicles with [_____] Kg maximum gross weight][Industrial vehicle loading with [_____] Kg maximum gross weight].

2.1.2.1 Cab Enclosures and Door Frame Finishes

NOTE: Indicate finish colors of elevator materials in finish schedule on drawings.

NOTE: Use stainless steel side panels and wall trim in hospital cars.

Provide finishes [as indicated.][as listed below:

- a. Floor; [mill finish steel diamond plate][painted steel diamond plate][aluminum diamond plate][tongue and groove hardwood][_____].
- b. Walls; [prefinished steel panels][stainless steel][_____].
Wall trim; [prefinished steel][stainless steel][_____].
Accessories; [handrails][_____].
- c. Interior face of doors; [prefinished steel][stainless steel][_____].
- d. Ceiling; [prefinished steel panels][stainless steel][anodized

aluminum][____].

2.1.2.2 Hoistway Doors and Frame Finishes

Provide finishes on exterior of hoistway as follows:

- a. Frame; [prefinished steel][stainless steel][____].
- b. Exterior face of door; [prefinished steel][stainless steel][____].

2.2 SPECIAL OPERATION AND CONTROL

NOTE: Include PREN 81-11 for new elevators in existing buildings.

Provide all special operations and control systems in accordance with EN 81-2 [,PREN 81-11] and requirements specified here in. Provide special operation key switches with [5] [6] pin cylinder locks with removable cores. Provide a key control lock for each operation system.

2.2.1 Firefighters' Service

NOTE: Designer shall coordinate the designated floor with the local Fire Department and edit the following paragraph.

NOTE: Firefighter Service is required on all freight and passenger elevators.

Provide Firefighters' Service, Phase I and II Service. Provide equipment and signalling devices. The designated level for the Firefighters' key operated switch is the [Ground][____] floor.

2.2.1.1 Phase 1 Emergency Recall Operations

A three-position key-operated switch shall be provided only at the designated level for each single elevator or for each group of elevators. The three-position switch shall be marked "BYPASS," "OFF," and "ON" (in that order) with the "OFF" position as the center position. The three-position switch shall be located in the lobby within sight of the elevator or all elevators in that group and shall not be located behind a locked door or cover. All keys shall be removable only in the "OFF" and "ON" positions. No device, other than the Phase I switch(es) or the smoke detectors in the elevator lobbies, machine room, or hoistway, shall initiate Phase I operation. Normal elevator service shall be provided and the operation from the smoke detectors shall be functional when all Phase I switches are in the "OFF" position. When the designated-level three-position switch is in the "BYPASS" position, normal elevator service

shall be restored regardless of the status of the smoke detectors.

When the three-position switch is provided, it shall function as follows in the " ON" position:

- a. All cars controlled by this switch which are on automatic service shall return nonstop to the designated level and power-operated doors shall open and remain open. On cars with two entrances, if both entrances can be opened at the designated level, the doors serving the lobby where the three-position Phase I switch is located shall open and remain open.
- b. A car traveling away from the designated level shall reverse at or before the next available landing without opening its doors.
- c. A car stopped at a landing shall have the in-car emergency stop switch or in-car stop switch rendered inoperative as soon as the car moves away from the landing. A moving car shall have the in-car emergency stop switch or in-car stop switch rendered inoperative without delay. Once the in-car emergency stop switch or in-car stop switch has been rendered inoperative, it shall remain inoperative while the car is on Phase I operation. All other stop switches shall remain operative.
- d. A car standing at a landing other than the designated level, with the doors open and the in-car emergency stop switch or in-car stop switch in the run position, shall conform to the following:
 - (1) Elevators having automatic power-operated horizontally sliding doors shall close the doors without delay and proceed to the designated level
 - (2) Elevators having power-operated vertically sliding doors provided with automatic or momentary pressure closing operation shall have the closing sequence initiated without delay, and the car shall proceed to the designated level.
 - (3) Elevators having power-operated doors provided with continuous pressure closing operation or elevators having manual doors; shall be provided with a visual and audible signal system to alert an operator to close the doors. Sequence operation, if provided, shall remain effective.
- e. Door reopening devices, for power-operated doors, which are sensitive to smoke or flame shall be rendered inoperative without delay. Door reopening devices not sensitive to smoke or flame (e.g., mechanically actuated devices) are permitted to remain operative.
- f. All car and corridor call buttons shall be rendered inoperative. All call registered lights and directional lanterns shall be extinguished and remain inoperative. Car position indicators, where provided, shall remain in service. Hall position indicators, where provided, shall be extinguished and remain

inoperative except at the designated level and the central control station, where they shall remain in service for fire department operations.

- g. Where provided on installations with vertical slide doors, corridor door open and corridor door close buttons shall remain operative.
- h. All cars shall be provided with an illuminating visual and audible signal system which shall be activated to alert the passengers that the car is returning nonstop to the designated level. The visual graphic shall be of a Firefighters' Helmet (25 mm x 25 mm). The signals shall remain activated until the car has returned to the designated level.
- i. A car stopped at a landing shall have the in-car door open button rendered inoperative as soon as the car moves away from the landing. A moving car shall have the in-car door open button rendered inoperative without delay. Once the in-car door open button has been rendered inoperative, it shall remain inoperative until the car has returned to the designated level.

2.2.1.2 Smoke Detectors

System type smoke detectors shall be installed in each elevator lobby and associated machine room. Smoke detectors are not required in elevator lobbies at unenclosed landings.

- a. The activation of a smoke detector in any elevator lobby, other than at the designated level, shall cause all cars that serve that lobby to return nonstop to the designated level.
- b. When the smoke detector at the designated level is activated, the operation shall conform to the requirements of Phase I Emergency Recall Operations, except that the cars shall return to an alternate level approved by the enforcing authority, unless the designated-level three-position Phase I switch is in the "ON" position.
- c. The activation of a smoke detector in any elevator machine room, except a machine room at the designated level, shall cause all elevators having any equipment located in that machine room, and any associated elevators of a group automatic operation, to return nonstop to the designated level. The activation of a smoke detector in any elevator machine room at the designated level shall cause all elevators having any equipment located in that machine room, and any associated elevators of a group automatic operation, to return nonstop to the alternate level, or the appointed level when approved by the authority having jurisdiction.
- d. Elevators shall only react to the first smoke detector zone which is activated for that group.
- e. Phase I operation, when initiated by a smoke detector, shall be

maintained until canceled by moving the Phase I Switch to the "BYPASS" position. Smoke detectors and/or smoke detector systems shall not be self-resetting.

2.2.1.3 Phase II Emergency In-Car Operation

A three-position ("OFF," "HOLD," and "ON", in that order) key-operated switch shall be provided in an operating panel in each car. The switch shall be rotated clockwise to go from the "OFF" to "HOLD" to "ON" position.

It shall become effective only when the designated level Phase I switch is in the "ON" position or a smoke detector has been activated, and the car has returned to the designated or alternate level by Phase I operation. The key shall be removable in each position. The "OFF", "HOLD," and "ON" positions shall not change the operation until the car is at a landing with the doors in the normal open position.

- a. When Phase II switch is in the "ON" position, the elevator shall be on Phase II operation, for use by trained emergency service personnel only, and the elevator shall operate as follows:
 - (1) The elevator shall be operable only by a person in the car.
 - (2) All corridor call buttons and directional lanterns shall remain inoperative. Car position indicators, where provided, shall remain in service. Hall position indicators, where provided, shall remain inoperative except at the designated level and the central control station, where they shall remain in service for fire department operations.
 - (3) The opening of power-operated doors shall be controlled only by a continuous pressure door open button. If the button is released prior to the doors reaching the normal open position, the doors shall automatically reclose. On cars with two entrances, if both entrances can be opened at the same landing, separate door-open buttons shall be provided for each entrance.
 - (4) Open power-operated doors shall be closed only by continuous pressure on the door close button. If the button is released prior to the doors reaching the fully closed position, horizontally sliding doors shall automatically reopen and vertically sliding doors shall automatically stop or stop and reopen. On cars with two entrances, if both entrances can be opened at the same landing, a separate door-close button shall be provided for each entrance.
 - (5) Opening and closing of power operated car doors or gates which are opposite manual swing or manual slide hoistway doors shall be controlled only by continuous pressure on door open and door close buttons. Door opening and closing buttons shall be provided in the car operating panel.
 - (6) All door reopening devices shall be rendered inoperative. Full speed closing is permitted. Corridor door opening and closing buttons, if provided, shall be rendered inoperative.

(7) Every car shall be provided with a button marked "CALL CANCEL," located in the same car operating panel as the Phase II switch, which shall be effective during Phase II operation. When activated, all registered calls shall be canceled and a traveling car shall stop at or before the next available landing.

(8) Floor selection buttons shall be provided in the car to permit travel to all landings served by the car and they shall be operative at all times. Means to prevent the operation of the floor selection buttons or door operating buttons shall be rendered inoperative.

(9) A traveling car shall stop at the next available landing for which a car call was registered. When a car stops at a landing, all registered car calls shall be canceled.

- b. When the Phase II switch is in the "HOLD" position, the elevator shall be on Phase II operation. The car shall remain at the landing with its doors open. The door close buttons shall be inoperative.
- c. When the Phase II switch is in the "OFF" position, the elevator is not at the designated level, and Phase I is in effect, the elevator shall operate as follows:
 - (1) Automatic power-operated horizontally-sliding doors shall close automatically and the car shall revert to Phase I operation upon completion of door closing. All door reopening devices shall remain inoperative. Door open buttons shall remain operative. Full speed closing is permitted. If the Phase II switch is turned to the "ON" or "HOLD" position prior to the completion of door closing, the doors shall reopen.
 - (2) Elevators having power operated vertically sliding doors shall have corridor door open and close buttons rendered operative. All door reopening devices shall remain inoperative. Door closing shall be controlled only by continuous pressure on the door close button. Full speed closing is permitted. If the Phase II switch is turned to the "ON" or "HOLD" position prior to the completion of door closing, the doors shall reopen. The car shall revert to Phase I operation upon completion of door closing.
 - (3) Elevators having manual doors shall revert to Phase I operation upon completion of door closing.
- d. When the Phase II switch is in the "OFF" position and the car is not at the designated level, and Phase I is not in effect, the car shall remain at the landing with the doors open and the door-close buttons inoperative.
- e. Elevators shall only be removed from Phase II operation when:

(1) The Phase II switch is in the "OFF" position and the car is at the designated level with the doors in the normal open position; or

(2) The Phase II switch is in the "OFF" position when Phase I is in effect.

2.2.1.4 Interruption of Power

Upon the resumption of power (normal, emergency, or standby), the car may move to reestablish absolute car position. Restoration of electrical power following a power interruption shall not cause any elevator to be removed from Phase I or Phase II operation.

2.2.2 Smoke Detectors

Smoke detectors are specified in Section 13852, "Interior Fire Alarm System", including conduit and wiring from each smoke detector to elevator machinery space control panel. Provide connections directly to elevator controls which will, when smoke is detected by any smoke detector, activate Firefighters' Service, and send each elevator to the correct floor as specified in paragraph entitled "Firefighters' Service". Provide dual contact smoke detectors located in the elevator lobbies, and the elevator machine room. The circuit for elevator controller actuation of Firefighters' Service shall include only these smoke detectors. Dual contact detectors will allow for a separate circuit while still maintaining total coverage of the building by the building fire protection panel. Ensure that all smoke detectors are mounted on finished ceiling.

2.2.3 Top-of-Car Operating Device

Provide operating device mounted on or from car crosshead, to permit operation of car at 0.75 mps maximum for adjustment, maintenance, testing, and repair. Include integral or remote safety device, continuous pressure "UP" and "DOWN" switches or buttons, emergency stop switch, and inspection switch.

2.2.4 Hoistway Access Switches

Provide key-operated hoistway access switch to permit limited movement of car at terminal floors for car positioning, operative only when "INSPECTION" switch in car operating panel is in the "INSPECTION" position. Locate switch 1800 mm above floor level, within 300 mm of hoistway entrance frame or with only ferrule exposed when located in entrance frame.

2.2.5 Independent Service

**NOTE: Use the last sentence in brackets when there
are two or more cars in group.**

Provide exposed key-operated switch in car operating panel to enable independent service and simultaneously disable in-car signals and

landing-call responses. Provide indicator lights that automatically illuminate during independent service. [If one car is removed from group, provide other car(s) responding to its hall call.]

2.2.6 Elevator Operation

NOTE: Choose one of the following four types of operations: Single Two-Stop Automatic, Selective Collective Automatic, Duplex Selective Collective or Group Automatic

NOTE: Include PREN 81-11 for new elevators in existing buildings.

EN 81-2, [PREN 81-11]. If automatic operation on emergency power is provided, the system must include a manual selection switch in the elevator lobby at the main landing. This switch is required to provide for manual selection of one elevator or the other, when operating on emergency power.

[2.2.6.1 Single, Two-Stop, Automatic Operation

NOTE: Specify for Single, Two-Stop elevator only.

Provide Single Two-Stop Automatic Operation. Provide illuminating push buttons.

]2.2.6.2 Selective Collective Automatic Operation

NOTE: Specify for single elevator serving three or more landings.

Provide Selective Collective Automatic Operation. Provide illuminating push buttons.

]2.2.6.3 Duplex Selective Collective Automatic Operations

NOTE: Specify for two adjacent elevators.

Provide Duplex Selective Collective Automatic Operation. Provide a single push button for terminal landings and dual push buttons, up and down, at intermediate landings. In each car operating panel, provide push buttons numbered to correspond to each landing. If a car is taken out of service or fails to respond to a landing call within a predetermined adjustable time limit of approximately 40 to 180 seconds, transfer calls to the other elevator functioning as a Selective Collective elevator until the

out-of-service car is returned to the system. Provide a push-button riser adjacent to each elevator.

][2.2.6.4 Group Automatic Operation

NOTE: Specify for three or more adjacent elevators.

Provide Group Automatic Operation. Provide a single push button for terminal landings and dual push buttons, up and down, at intermediate landings. In each car operating panel, provide push buttons numbered to correspond to each landing. If a car is taken out of service, or fails to respond to a landing call within a predetermined adjustable time limit of approximately 40 to 180 seconds, transfer calls to another car until out-of-service car is returned to the system. Provide a push-button riser adjacent to each elevator.

][2.2.7 Parking Switch

NOTE: Specify parking switch if there is a definite reason to change parking station daily or for security purposes. For example, to provide night shut down of a car for security reasons. Indicate parking floor.

Provide two-position parking switch in car station service cabinet. One position causes car to remain parked at floor landing where last used; other position causes car to park at [main] [_____] floor.

][2.2.8 Hospital Emergency Commandeering Service

NOTE: Commandeering Service can be used for priority service. Duplication of keys by unauthorized persons is possible. The designer must decide whether security of individuals or quickness in obtaining car is governing consideration for each project. Verify with facility personnel that control of key duplication can be maintained.

Provide "ON-OFF" key switch and indicator light at [designated] [all] landings to cause one elevator to respond directly to the landing activated. Turning switch to "ON" position cancels previously registered "CAR" calls and requires car to bypass hall calls while in route to activated landing. On arrival, car will remain at landing with hoistway and car doors open for predetermined time to permit car to be placed on emergency service. If the person decides not to use car during predetermined time period, car door will close and car will automatically return to normal service. Provide indicator lights that automatically illuminate during emergency service. Key shall be removable only in "OFF"

position.

]2.3 ELEVATOR DRIVE SYSTEM

**NOTE: Include the bracketed option for a
cylinder/plunger/sheave assembly where roped
hydraulic elevators are specified.**

Provide hydraulic pump unit, piping, cylinder/plunger[/sheave] assembly, and rated equipment which will operate at a maximum working pressure of less than 2756 kPag when running in the up direction, with rated load and at rated speed.

2.3.1 Hydraulic Pump Unit

Provide self-contained unit including oil-hydraulic elevator submersible or non-submersible pump, electric motor, drive assembly, oil strainer in suction line, structural steel outer base with tank and supports, oil-tight drip pan, and inner pump-mounting base. Limit acoustic output of elevator machine to 80 dBA. Provide sound-insulating panels to isolate airborne noise from pump-motor assembly. Provide ventilation to cool power unit. Finish ferrous surfaces with rust-inhibiting paint.

2.3.1.1 Tank Capacity

Provide tank capacity for full plunger displacement plus at least 38 liters.

2.3.2 Hydraulic Controls and Equipment

Provide electrically operated "UP" valve, constant velocity "DOWN" valve, "UP" and "DOWN" leveling valves, "BYPASS UPON STARTING" valve, check valve, vacuum relief valve, automatic shutoff (rupture) valve, safety relief valve, manually operated lowering valve, and scavenger pump unit.

2.3.2.1 Manual Shutoff Valves

Provide 1/4 turn ball valve rated at 2 MPa at elevator hydraulic pump suction inlet if pump is mounted outside the oil reservoir and the suction line exits the reservoir below the maximum oil level in the reservoir. Provide 1/4 turn ball valve rated at 4 MPa at elevator pump discharge line in the machine room and in the supply line next to and on the pump side of the automatic shutoff valve in the pit.

2.3.2.2 Manual Lowering Valve

Limit car descending speed under manual operation to 0.10 mps. Provide rigid plastic red tag for valve identification, inscribed "MANUAL LOWERING VALVE."

2.3.2.3 Pump Discharge Strainer

Provide strainer in pump discharge to prevent foreign materials from

entering control system and jack.

2.3.2.4 Muffler

Provide blowout-proof muffler, containing pulsation-absorbing materials in oil line between pump unit and jack.

2.3.2.5 Pressure Switch

Where cylinders are installed with top of cylinder above top of oil reservoir, provide pressure switch in oil line between cylinder and electric lowering valve(s) to prevent operation of lowering valve(s) unless positive pressure exists at top of cylinder.

2.4.2.6 Scavenger Pump Unit

Provide a scavenge oil reservoir, an electrically operated oil transfer pump, scavenge oil lines, a strainer, and pump controls. Connect the scavenge oil reservoir to the elevator cylinder between the plunger packing area and the plunger drip (wiper) ring, to capture the oil leaking by the plunger pressure packing. Provide a vacuum relief valve. Connect the scavenge oil pump suction to the scavenge oil reservoir and the strainer, and the discharge to the elevator oil reservoir. Provide a scavenge oil reservoir level switch to control the scavenge oil pump. Scavenger pump shall operate independently of elevator hydraulic fluid pressure. Provide a manual-reset pit flood switch to prevent pump operation if pit is flooded. Anchor pump and oil reservoir to the pit floor.

2.4.2.7 Piping and Accessories

Provide rigid steel hydraulic black steel piping and black steel fittings with a minimum nominal pressure rating of 250 Bar. Piping shall extend from the pump control valve body, inside the pump unit, to the hydraulic cylinder in the hoistway. Provide dielectric union at each end of the pump to the cylinder pipe run. Provide hangers or supports for all piping. Provide welded or threaded forged pipe fitting for all fittings located between the shut-off valve and the cylinder inlet.

2.4.2.8 Low Oil Condition

Provide device for [each] elevator to protect pumping equipment in event oil level is too low. When device operates, it shall stop pump and motor and cause car to descend to lowest landing, open car doors and cease elevator operation except for door control circuits. Provide illuminating indicator on machine room control panel to alert of low oil condition.

2.3.2.9 Oil Characteristics

- a. Viscosity, Saybolt Universal Seconds 145 to 160 at 38 degrees C.
- b. Viscosity, Saybolt Universal Seconds 42 to 44 at 99 degrees C.
- c. Pour Point, -26 degrees C maximum.

- d. American Petroleum Institute (API) Gravity 29 to 33 at 15 degrees C.
- e. Flash Point 190 degrees Cminimum.

2.3.2.10 Oil Temperature Device

Provide means to maintain oil temperature between 15 and 38 degrees C regardless of ambient temperature.

**NOTE: Include the bracked option for a
cylinder-plunger-sheave unit where roped hydraulic
elevators are specified.**

2.3.3 Cylinder, Plunger [,and Sheave] Unit

**NOTE: For 2 landings only, holeless
cylinder-plunger units are an acceptable design
option.**

**NOTE: Choose the first bracketed paragraph for
direct plunger elevators, the second bracketed
paragraph for holeless hydraulic, and third
bracketed paragraph for roped hydraulic.**

[Provide a direct plunger type hydraulic elevator. Provide a plunger of single-piece seamless steel construction. Provide stop plate or ring welded to bottom of the plunger. Provide packing and wiper (drip) ring with outlet for connection to the scavenge oil reservoir to collect leakage oil from cylinder for either inspecting for contamination or returning to tank. Use only standard packing glands with bolts that compress packing. Provide threaded 6 mm bleeder valve at top of cylinder just below packing gland. Telescopic cylinder-plunger units are not acceptable.]

[Provide a indirect plunger holeless hydraulic elevator using two jack assemblies. Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operation pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machine true and smooth with a fine polished finish. Each plunger shall be provided with stop ring electrically welded to prevent the plunger from leaving the cylinder. Telescopic cylinder - plunger units are not acceptable.]

[Provide two (2) single-stage, indirect type, jack assemblies, one (1) on each side of the car platform. Each jack assembly shall consist of a plunger, cylinder, cylinder blocking and pit stand, which is to be attached

to the pit floor. Each plunger shall be arranged to accept a sheave assembly having "U" groovers and a guided rams header.

Hoist ropes of adequate size and quantity shall be provided, which will be dead-ended on the pit stand, run up to and over the sheave assembly, and down to a structural member on the car frame, where it will again be dead-ended. Rope shackles of adequate design shall be provided at each end. The roping ratio shall be 1.2.

The sheave assembly shall be attached to the plunger by means of a yoke completed with a rams header. The rams header shall have slider type guide shoes which shall ride on a set of guide rails mounted to the building structure by means of rail brackets. Movement of the plungers in unison shall cause the sheaves to turn, pulling the ropes to move the entire car. Telescopic cylinder-plunger units are not acceptable.]

2.3.4 Cylinder Protection

Protect the cylinder with a pipe-manufacturer applied "Applied Extruded Coating." The AEC coating application process shall include the following steps as a minimum: blast clean the bare pipe exterior surfaces to white metal, apply a minimum of 0.25 mm undercoating of heated butyl rubber adhesive; and apply a minimum of one mm thickness overcoating of polyethylene, hot extruded over the undercoating. The overcoating shall be free of surface blemishes, cracks, voids, and contamination from foreign substances. Field pipe joints and coating repairs shall be field applied coatings covered with heat-shrinkable pipe sleeves, following the cylinder manufacturer's instructions. Protect the AEC coating from damage until the cylinder is set into the cylinder well, plumbed, and aligned.

2.3.4 Automatic Shutoff Valve

Provide automatic shut-off valve in oil supply line as close to cylinder inlet as possible. Provide threaded pipe connections to the valve. When there is ten percent drop in NO-LOAD operating pressure, automatic shut-off valve shall be activated. When activated, device shall immediately stop descent of elevator and hold elevator until lowered by use of manual lowering feature of valve. Arrange manual lowering feature of automatic shut-off valve to limit descending speed of elevator to 0.10 meters per second. Exposed adjustments of automatic shut-off valve shall have means of adjustment sealed by certified elevator inspector after being set to correct position and tested in accordance with Part 3 specification paragraph entitled "Automatic Shutoff Valve Tests." Twin cylinders require automatic shutoff valve to be installed before a split in the piping line to supply each cylinder.

NOTE: For direct plunger elevators include the following paragraphs; "Cylinder Well System", "Well Casing", "PVC Liner and "Pressure Test."

2.4.6 Cylinder Well System

Shall consist of a well casing and a liner.

2.3.6.1 Well Casing

Drill well for hydraulic cylinder, providing adequate depth, as indicated.

Line well with steel casing with minimum wall thickness of 6 mm and minimum inside diameter of not less than 125 mm larger than PVC liner maximum outside diameter, including cap and couplings. Close bottom of well casing with steel plate at least twice as thick as casing wall thickness, welded continuously all around, prior to insertion into well, or close well casing bottom by plugging with minimum of 150 mm of concrete, embedding casing bottom at least 50 mm but not more than 100 mm into the wet concrete. Install cylinder well casing not more than 25 mm out of plumb over entire length. Backfill the well outside of the casing with fine, dry, salt-free sand, as required to maintain casing straight and plumb, or backfill with bentonite grout if more than one water-bearing strata are penetrated by well. Maintain well casing pumped dry throughout remaining installation of elevator.

2.3.6.2 PVC Liner

Provide rigid PVC pipe liner with a minimum nominal pressure rating of 10 Bar, with bottom cap and couplings; joints sealed watertight using PVC pipe manufacturer's recommended adhesive or heat welding methods. Liner inside diameter not less than 76 mm larger than elevator cylinder maximum outside diameter. Set PVC liner into well casing, centered and plumb. Securely locate PVC liner bottom end within well casing with fine, dry, salt free sand.

2.3.6.3 Pressure Test

Install pressure test cap onto PVC liner, equipped with at least: safety relief valve set to relieve at 205 kPag; 114 mm diameter dial pressure gage scaled for 0 to 690 kPag and calibrated to 0.5 percent accuracy; and an air pressure admission throttling and shutoff valve. Perform air pressure test by slowly admitting dry compressed air to pressurize PVC liner to 205 kPag..

Shut off air supply at throttle/shutoff valve, disconnect compressed air source, observe and record air pressure in PVC liner every 5 minutes for not less than 30 minutes. Liner shall not allow drop in air pressure in excess of one kPag over the 30 minute test period. Perform test in presence of ROICC and NAVFAC certified elevator inspector. Upon satisfactory completion of pressure test, remove test cap and dry interior of PVC liner. Upon failure of test, remove, repair, reinstall, and retest PVC liner until satisfactory. For safety, pressure test shall only be performed when liner is fully inserted in the well casing and well.

2.3.6.4 Cylinder Installation

**NOTE: Include the following paragraph with
bracketed option for direct plunger elevators,
include only the bracketed option to plumb cylinders
for roped and holeless hydraulic elevators.**

Remove surface moisture from inside of liner by wiping with dry cloth or purging with warm dry air prior to installing elevator cylinder. Install cylinder. Provide elevator manufacturer's recommended supports under cylinder head and attach cylinder head supports to cylinder and pit support channels in accordance with elevator manufacturer's instructions. Set cylinder into the pit in accordance with elevator manufacturer's instructions. [Plumb cylinder using "Spider-Bob" method.]

NOTE: For direct plunger elevator include the following paragraphs; "Casing Fill", "Liner Inspection and Test Tube", "Cylinder Bottom Location Fill", and "Seal."

2.3.6.5 Casing Fill

Following cylinder installation, fill the space between PVC liner and steel casing with fine, dry, salt-free sand in 610 mm lifts with tamping between each lift. Continue filling with sand up to the level at the pit floor seal.

2.3.6.6 Liner Inspection and Test Tube

Provide a 19 mm PVC test tube with strainer located within 152 mm of bottom of liner. Strainer shall exclude sand and admit air, water or oil. Provide top of test tube with removable cap to exclude foreign matter.

2.3.6.7 Cylinder Bottom Location Fill

At the option of the contractor, clean dry sand may be used up to and not more than 610 mm above the bottom of the cylinder, to stabilize the cylinder. Remainder of the liner shall be empty.

2.3.6.8 Seal

Seal gap between cylinder and PVC liner and gap between liner and well casing with foam insert strong enough to retain and support final grouting.

Provide 21 MPa grout to a minimum of 102 mm thickness and level top of final grouting with pit floor. Test assembled PVC liner and elevator cylinder system with 21 kPag, equivalent to test in paragraph entitled "Pressure Test" to ensure integrity of final PVC liner system. Repair if necessary.

2.3.6.9 Containment

Protect portions of hydraulic elevator oil supply line that are installed below ground, encapsulated in concrete, or covered by construction, with continuous rigid PVC containment system, with a minimum nominal pressure of 10 Bar, extending from machine room to elevator cylinder head connection. Coat and wrap line similar to elevator cylinder. Cap and seal containment system annular space.

2.3.7 Motors

CEI EN 60034-1,(CEI 2-3). Provide squirrel cage, induction motors with drip-proof enclosure, continuous rated, maximum 1800 rpm, and Class F insulation rated at 120 starts per hour.

2.3.7.1 Insulation Resistance and Motor Nameplate Data

Provide minimum of one megohm insulation resistance between conductors and motor frame. Provide motor nameplate listing rated wattage horsepower, speed, and ampere, permanently mounted in position visible to viewer without use of special tools, such as a mirror. Provide motor and pump data on the outside of machine frame.

2.3.7.2 Maximum Allowable Motor Amperage

When motor is running and elevator is lifting rated load at rated speed, motor shall not exceed its own nameplate amperage.

2.4 CONTROL EQUIPMENT

NOTE: The use of wye delta in lieu of resistance reduced-voltage starters depends upon manufacturer, elevator capacity, electrical power characteristics, and cost. Most manufacturers use wye delta reduced-voltage starters when three phase power is available. For motors greater than 11 kw 15 horsepower, use power factor correcting capacitors to increase power factor to unity.

CEI EN 60947-4-1. Provide elevator motor controller of magnetic reduced-voltage resistance or wye-delta start with overload relays in each line and reverse phase relay. Provide controls for [sequential] starting, stopping, and speed of elevator and to give specified operation. Enclose control equipment in factory-primed and baked-enamel coated sheet-metal cabinets with removable or hinged doors and ventilation louvers.

NOTE: Use microprocessors for elevator logic control. However, in a remote location where necessary diagnostic tools and qualified service personnel are not available in the immediate area, do not allow this type of equipment. In addition, solid state control is not desirable for any facility which is subject to an erratic building power supply. In either situation, specify an electromagnetic switch, relay logic controller. If a microprocessor is allowed, the mechanical design for the elevator machine room must include the HVAC recommended by the control system manufacturer.

2.4.1 Logic Control

[Provide solid-state microprocessor controller to enable programmable control of call allocation, logic functions, door control, speed sensing and car position. Provide a method of reprogramming adjustable parameters of computerized controls. Store all programming in non-volatile memory. The microprocessor control system is acceptable only if hardware and software required to maintain and utilize microprocessor is provided and training is provided to Government Personnel by the equipment manufacturer and supplier.]

[Provide electromagnetic switch, relay logic controller.]

2.4.1.1 Repair Requirements

**NOTE: When microprocessor control system is used,
mechanical design for the project shall provide the
HVAC heating and cooling required by control
manufacturer for elevator machinery space.**

For the repair of microprocessor control system, provide maintenance tools, supporting computer software, and software documentation required for complete maintenance of elevator system including diagnostics and adjustments. Tools may be hand held or built into control system. Provide tools which do not require recharging to maintain their memory or authorization for use. Do not use software which requires periodic reprogramming, or reauthorization. Programs shall be stored in non-volatile memory. Tools and software may be factory programmed to operate only with this project's identification serial number.

2.4.2 Self-Leveling and Anti-Creep Device

Provide [each] elevator with two-way, automatic self-leveling device that brings car floor to within 6 mm of level with floor landing regardless of load, position of hoistway door, or direction of travel. The device shall operate the car at a speed not to exceed 0.125 meters/second and maintain the car within 6 mm of landing level.

2.5 OPERATING PANELS, SIGNAL FIXTURES, AND COMMUNICATIONS CABINETS

2.5.1 Capacity and Data Plates

Attach faceplates with spanner security screws. On car panel, provide stainless steel capacity and data plates, with name of elevator manufacturer.

2.6.2 Car and Hall Buttons

Provide recessed tamper-proof push buttons of minimum 20 mm size satin-finish stainless steel, with illuminated jewel center.

2.5.2.1 Hall Station Door Operating Buttons

**NOTE: Use for freight elevators with power-operated
bi-parting doors.**

Identical in size and design to hall call buttons, but not illuminated.
Mount center line of hall call button at least 1830 mm above the lobby
floor.

2.5.3 Passenger Car-Operating Panel

**NOTE: Use two panels for busy passenger elevators
in hospital buildings and office buildings. Use one
car operating panel for single or two elevator
system where traffic is moderate such as in
barracks, warehouses, clinics or shops. For front
and rear openings at a floor, provide two floor
buttons marked "F" and "R" for operating door open
and close.**

Provide each car with [one] [two] car operating panel that contains
operation controls and communication devices. Provide exposed, flush
mounted buttons for the controls that must be passenger accessible.
Provide service cabinet or keyed switches for those switches that should
not be passenger accessible. Allow maximum 1200 mm between car floor center
line of top operating buttons. Allow 900 mm between car floor and center
line of bottom button. Use engraving and backfilling or photo etching for
button and switch designations. Do not use attached signs. Locate
controls on a front wall of cab. All elevator designations and
nomenclature shall be written in English.

2.5.3.1 Passenger Controls

- a. Illuminated operating call buttons identified to correspond to
landings served by elevator car. [For two openings at a floor,
provide two buttons, marked "FRONT" and "REAR" above buttons.]
- b. "DOOR OPEN" and "DOOR CLOSE" buttons.
- c. Keyed "STOP" switch.
- d. "ALARM" button. Alarm button shall be red with engraved legend
"ALARM." Alarm button shall illuminate when pushed. Locate
"ALARM" button at panel bottom.
- e. "FIRE DEPARTMENT" key switch, with "OFF-HOLD-ON" positions, in
that order with key to be removable in all positions. Provide
fire sign or jewel, and audible signal device. Both visual and
audible signals are activated when Phase I key switch in hall is
activated or when smoke detector activates return of elevator(s)
to main fire response floor. Visual and audible signal shall
remain activated until car has reached main or designated

alternate fire response floor. Upon arrival at fire response floor visual signal remains illuminated and audible signal becomes silent.

- f. Emergency two-way communication. Provide momentary pressure, single illuminating pushbutton operated communication device intergal with car operating panel that does not require manipulation of doors or panels. Provide engraved and backfilled international telephone symbol on dark contrasting color background. Size symbol not less than 19 mm by 19 mm.

[g. Key-operated on-off "HOSPITAL EMERGENCY COMMANDEERING SERVICE" switch.]

NOTE: Omit the following paragraph, "...phone jack.", unless specifically requested by the activity.

[h. Sound-actuated firefighter phone jack.]

2.5.3.2 Service Controls

- a. Inspection switch that transfers car control to top-of-car inspection operating controls and prevents car operation from in-car control panel.
- b. Independent service switch.
- c. Two car light switches, one for light in car and one for lights on top and bottom of car frame.
- d. Fan switch, two-speed.
- e. 120-volt ac 60 Hz single-phase duplex electrical outlet of ground-fault-circuit-interrupt (GFCI) design.
- f. Device for communication between car and elevator machine room.

[g. Parking switch.]

2.5.3.3 Certificate Window

Provide 100 mm high by 150 mm wide certificate window in car operating panel for elevator inspection certificate.

[2.5.4 Freight Car-Operating Panel

Provide 3 mm thick stainless steel face plate with edges relieved. Provide each car with [one] [two] car operating panel that contains operation controls and communication devices. Provide exposed, flush mounted buttons for the controls that must be passenger accessible. Provide service cabinet or keyed switches for those controls that should not be passenger

accessible. Allow maximum 1200 mm between car floor and center line of top operating button. Allow 900 mm between car floor and center line of bottom button. Use engraving and backfilling or photo etching for button and switch designations. Do not use attached signs. All elevator designations and nomenclature shall be written in English.

2.5.4.1 Passenger Controls

- a. Illuminated operating call buttons identified to correspond to landings served by elevator car. [For two openings at a floor, provide two buttons marked "FRONT" and "REAR" above buttons.]
- b. Manual "STOP" switch with the following features:
 - (1) Red operating handles or buttons
 - (2) Conspicuously and permanently marked "STOP" and shall indicate the stop and run positions
 - (3) Positively opened mechanically and their opening shall not be solely dependent on springs.
- c. "ALARM" button. Alarm button shall be red with engraved legend "ALARM". Alarm button shall illuminate when pushed. Locate "ALARM" button at panel bottom.
- d. "FIRE DEPARTMENT" key switch, with "OFF-HOLD-ON" positions, in that order with key removable in all positions. Provide fire sign or jewel and audible signal device. Both visual and audible signals are activated when Phase I key switch in hall is activated or when smoke detector activates return of elevator(s) to main fire response floor. Visual and audible signal shall remain activated until car has reached designated or alternate fire response floor. Upon arrival at fire response floor visual signal remains illuminated and audible signal becomes silent.
- e. Emergency two-way communication. Provide momentary pressure, single illuminating pushbutton operated communication device intergal with car operating panel that does not require manipulation of doors or panels. Provide engraved and backfilled international telephone symbol on dark contrasting color background. Size symbol not less than 19 mm by 19 mm.
- [f. Key-operated on-off "HOSPITAL EMERGENCY COMMANDEERING SERVICE SWITCH".]

NOTE: Omit the following paragraph, "...phone jack," unless specifically requested by the activity.

[g. Sound-actuated firefighter phone jack.]

2.5.4.2 Service Controls

- a. Inspection switch that transfers car control to top-of-car inspection operating controls and prevents car operation from in-car control panel.
- b. Independent service switch.
- c. Two car light switches, one for light in car and one for lights on top and bottom of car frame.
- d. Fan switch, two-speed.
- e. 120-volt ac 60 Hz single-phase duplex electrical outlet of ground-fault-circuit-interrupt (GFCI) design.
- f. Communication device between car and elevator machine room.
- [g. Parking switch.]

2.5.4.3 Certificate Window

Provide 100 mm high by 150 mm wide certificate window in car operating panel for elevator inspection certificate.

]2.5.5 Semi-Selective Door Operation

NOTE: Use semi-selective operation for elevators with rear openings but no landing with both front and rear openings. Use full selective if, at any floor, there are both front and rear openings. This applies to both passenger and to freight elevators.

For elevator with rear opening at elevations that differ from front opening, provide semi-selective door operation so that only car door or gate opposite hoistway door opens when car stops.

]2.5.6 Full-Selective Door Operation

For elevator with one or more rear openings at same level as front opening, provide full-selective operation with car and door operating buttons clearly marked for front and rear openings, front and rear car button for each such floor, and front and rear "DOOR OPEN" and "DOOR CLOSE" buttons. Only door for which button was operated opens or closes.

]2.5.7 Switches and Devices

Provide elevator manufacturer's standard grade for switches and devices on car operating panel. Legibly and indelibly identify each device and its operating positions. Locate car dispatching buttons in identical positions in car operating panels for corresponding floors.

2.5.8 In-Car Position and Direction Indicator and Signal

In-car direction indicator shall be included in the in-car position indicator fixture.

2.5.8.1 In-Car Position Indicator and Signal

Provide horizontal electrical or electronic digital position indicator located minimum of 2135 mm above car floor. Arrange indicator to show floor position of car in hoistway and its traveling direction. Indicate position by illuminating of numeral or letter corresponding to landing at which car is passing or stopping. Provide audible signal to alert passenger that elevator is passing or stopping at a floor. Provide audible signals exceeding ambient noise level by at least 20 decibels with frequency not higher than 1500 Hz.

2.5.8.2 In-Car Direction Indicator and Signal

Provide visual and audible car direction indicators in car, indicating car traveling direction. For visual directional signal, provide arrow of minimum 65 mm in size. Use equilateral triangles for arrows, green for upward direction and red for downward direction. Provide audible signal that sounds once for upward direction and twice for downward direction.

2.5.9 Landing Position and Direction Indicator and Signal

Provide a single fixture containing the landing position and direction indicator.

2.6.9.1 Landing Position Indicator and Signal

Provide an electrical or electronic digital position indicator similar to the car position indicator. Arrange position indicator in wall horizontally above the door frame or vertically at the side of the door frame. Indicators to show floor position of car in hoistway. Indicate position by illumination of numeral or letter corresponding to landing at which car is passing or stopping.

2.6.9.2 Landing Direction Indicator and Signal

Provide landing direction indicator with visual and audible signal devices. Provide single direction indicator at terminal floors; "UP" and "DOWN" direction indicator at intermediate floors. Provide equilateral triangles not less than 65 mm in size, green for upward direction and red for downward direction. Provide electronic audible device that sounds once for upward direction and twice for downward direction. Provide audible signals exceeding ambient noise level by at least 20 decibels with frequency not higher than 1500 Hz.

2.6 HOISTWAY AND CAR EQUIPMENT

NOTE: Include PREN 81-11 for new elevators in existing buildings.

EN 81-2 [,PREN 81-11].

2.6.1 Guide Rails and Fastenings

Paint rail shanks with one coat black enamel. Only T-section type rail is acceptable.

2.6.2 Car Buffers

Provide buffer data plate on each buffer.

2.6.3 Pit Equipment

2.6.3.1 Pit "STOP" Switch

Provide push/pull type pit "STOP" switch for stopping elevator motor, independent of regular operating device. Locate on same side of hoistway as ladder.

2.6.3.2 Ladders

NOTE: Pits over 900 mm 3 feet deep require a ladder which is usually included in Section 05500, "Metal Fabrications". Use the second bracketed option in the following paragraph when Section 05500 is not included in project specification.

[Section 05500, "Metal Fabrications".] [Galvanized steel. Provide ladders capable of withstanding a concentrated load of 45 Kg on all surfaces that will support the weight of the user. Provide steel ladder with a minimum 19 mm thick rungs and a maximum vertical spacing of 305 mm. Provide rungs 406 mm wide (clear) spaced 178 mm from supporting wall to centerline of rung. Cross sectional centerline of ladder shall be 380 mm clear distance from the wall or other obstructions on the sides of the ladder. Locate ladder on hoistway side wall closest to hoistway door opening.]

2.6.7.3 Lighting of Pits

Locate externally guarded pit light not less than 1800 mm above pit floor. Pit light levels shall be not less than 54lux. Locate switch on same side of hoistway as ladder. Provide GFCI duplex receptacle in each pit.

2.6.4 Wiring and Traveling Cables

CEI 64-8, CEI 20-25, UNEL Table 73659 and Section 16402, "Interior Distribution System." Suspend traveling cables by means of self-tightening webbed devices. Provide new traveling cables when installing new elevator in existing shafts. Provide anti-snap protection for rail brackets and clip belts against traveling cables catching on them.

2.6.5 Emergency Signaling Device

Provide audible signaling device, operable from Car Operating Panel button marked "ALARM". The audible signaling device shall be mounted in hoistway.[In addition, for freight elevators, operation of the EMERGENCY STOP button shall sound audible signaling device.]

NOTE: For roped hydraulic elevators include the following paragraphs; "Driving Ropes", "Governor", "Governor Pit Tensioning Sheave", "Governor Rope and Shackles".

[2.6.6 Driving Ropes

PREN 12385-5.

2.6.7 Governor

Provide centrifugal-type, car driven governor with pull through jacks mounted at top of hoistway. Provide supports required for attachment to building structure. It shall be positioned such that it can be accessed, inspected and tested from outside of the hoistway by use of hoistway access opening.

2.6.8 Governor Pit Tensioning Sheave

Mount frames on pit support members or guide rails. Provide with guides or pivot to enable free vertical movement for proper tensioning of rope. Provide guard to protect sheaves from falling debris.

2.6.9 Governor Rope and Shackles

The governor rope shall be of construction and composition required for the governor furnished. Under normal operation of the elevator, the governor rope shall run free and clear of safety, rope guards and other stationary parts.

Provide adjustable length type rope shackle or other approved type with individual tapered, babbitted rope sockets or individual wedge rope sockets for each end of the rope.

]2.7 PASSENGER CAR AND HOISTWAY DOOR ACCESSORIES

Provide infra-red curtain unit. Provide high-speed electric operator, safety interlocks for car and hoistway doors, and electric safety contact to prevent car operation unless doors are closed. [Provide electrical circuitry that restores car to service at a specified time lapse with time out circuitry as an option for intensive service elevators.]

2.7.1 Infra-red Curtain Unit

Provide Infra-red Curtain Unit (ICU) with multiple infra-red beams that protect to the full height of the door opening. Minimum coverage shall extend from 50 mm off the floor to 1778 mm above floor level.

2.7.2 Door Operator

Provide medium speed, heavy-duty, DC master door operator capable of opening doors at no less than 1-1/2 f.p.s., and accomplishing reversal in no more than 2 1/2 inches of door movement. Open doors automatically when car arrives at a floor to permit egress of passengers. Close doors automatically after a timed interval. It shall be adjusted to provide smooth quiet operation and meet performance criteria specified.

2.7.3 Door Reopening and Control Device

2.7.3.1 Infrared Detector Device

- a. Provide multi-beam infra-red pulsed screen car door protective device projecting across entire entrance opening. If the device becomes inoperative, the door closing kinetic energy shall immediately be reduced to a maximum of 3.4 joules and a buzzer will sound during each closing operation.
- b. If screen is interrupted after doors are open, reduce time doors normally remain fully open to an adjustable time (1 to 5 seconds,) with initial setting at one second after screen is reestablished.

2.7.3.2 Nudging Action

If door opening is obstructed for a predetermined adjustable time (15 to 45 seconds), with initial setting at 20 seconds, sound buzzer and attempt to close doors with a maximum 3.4 joules of kinetic energy.

2.7.3.3 Differential Door Time

Provide separately adjustable timers to enable varying time that doors remain open after stopping in response to calls as follows:

- a. Car call hold open time adjustable between 1 and 10 seconds. Initial setting at 3 seconds.
- b. Landing call hold open time adjustable between 1 and 15 seconds. Initial setting at 5 seconds. Use landing call timing when responding to coincidental calls.

2.8 PASSENGER ELEVATOR GUIDES, FRAME, PLATFORM, AND ENCLOSURE

NOTE: Use roller guide assemblies on all passenger elevators.

2.8.1 Roller Guides

Provide roller guide assemblies in adjustable mountings on each side of car in accurate alignment at top and bottom of car frame. Provide 6 mm thick steel retainer plate, or equivalent, under roller guide and guide shoe

mounting at top and bottom of car and counterweight frames to span entire finished guide rail tongue.

2.8.2 Car Frame and Platform

2.8.2.1 Car Frame

Provide all elevators with a car frame. Car frame shall be guided on each guide rails by upper and lower guiding members. The car frame shall be constructed of structural steel members of adequate strength. The frame shall consist of two (2) side members, two (2) cross head members and platform support frame. All members are to be securely fastened together and reinforced to form a unitized section. The lower portion of the support frame shall be arranged to accept the car's safety.

**NOTE: For Rope Hydraulic Elevators, use the
following paragraph, "Hoisting Ropes and Shackles".**

2.8.2.2 [Hoisting Ropes and Shackles]

Provide wire ropes specifically designed for elevator application. Provide for each end of the ropes on adjustable length type rope shackles or other approved type with individual tapered, babbittal rope sockets or individual wedge rope sockets].

2.8.2.3 Car Safety

Car safeties shall be provided for roped-hydraulic elevators and shall be permitted to be provided for direct-acting hydraulic elevators. When provided, car safeties shall conform to the requirements following:

- a. The slack rope device required by EN 81-2 shall be permitted to be an additional means of activating the car safety on roped-hydraulic elevators using hydraulic jacks equipped with plungers. The slack rope device required by EN 81-2 shall be an additional means of activating the car safety on roped-hydraulic elevators using hydraulic jacks equipped with pistons.
- b. The safety shall be of a type which can be released only by moving the car in the up direction. To return a car to normal operation after a safety set, the car shall be moved hydraulically in the up direction. For repairs of an obvious or suspected malfunction, the car shall be permitted to be raised by other means capable of holding the entire car weight. Prior to releasing the other means, the car shall be run hydraulically in the up direction.
- c. The switches shall, when operated, remove power from the hydraulic machine motor and control valves before or at the time of application of the safety.

2.8.2.4 Maximum Allowable Car Frame and Platform Stresses

The stresses in car-frame and platform members and their connections, based on the static load imposed upon them, shall not exceed the forces stated in Table 1.

TABLE 1

MAXIMUM ALLOWABLE STRESSES IN CAR-FRAME AND PLATFORM MEMBERS AND CONNECTIONS

Member	Type of Stress	Max. Stress, kPa	Area Basis
Car crosshead	Bending	94460	Gross section
Car-frame plank (normal loading)	Bending	94460	Gross section
Car-frame plank (buffer reaction)	Bending	189606	Gross section
Car-frame uprights	Bending plus tension	113764	Gross section
		136516	Net section
Hoisting rope hitch plate and shapes	Bending plus tension	75842	Net section
Platform framing	Bending	94803	Gross section
Platform stringers	Bending	113764	Gross section
Threaded brace rods and other tension members except bolts	Tension	60674	Net section
Bolts	Tension	53089	Net section
Bolts in clearance holes	Shear	53089	Actual gross area in shear plane
Bolts in clearance holes	Bearing	120658	Gross section
Rivets or tight body-fit bolts	Shear	75842	Actual area in shear plane
Rivets or tight body-fit bolts	Bearing	137895	Gross section

2.8.2.5 Car Platform

Provide all elevators with a platform consisting of a nonperforated floor attached to a platform frame supported by the car frame, and extending over the entire area within the car enclosure. The platform-frame members and the floor shall be designed to withstand the forces developed under the loading conditions for which the elevator is designed and installed. The platform shall be steel construction mounted on frame with vibration isolation pads. The floor is to be constructed of wood layered over wood sub-floor. The underside of the platform shall be properly fireproofed.

2.8.2.6 Maximum Allowable Car-Frame and Platform Member Deflection

The deflections of car-frame and platform members based on the static load imposed upon them shall be not more than the following:

- a. for crosshead: 1/960 of the span
- b. for plank: 1/960 of the span
- c. for uprights (stiles) The moment of inertia of each upright shall be not less than determined by the following formula: $I = \frac{KL^3}{457.2EH}$
- d. for platform-frame members: 1/960 of the span.

2.8.3 Car Enclosure, Car Door, and Car Illumination

**NOTE: For hospital service, consider providing
separate elevators for routine hospital service and
passenger service.**

Provide natural and forced ventilation, stainless steel hook with fire retardant pads, and emergency exit. Provide level of illumination at the car controls, platform, and car threshold and landing sill of at least 53.8 lux. Carpeting shall comply with the requirements of the authority having jurisdiction when tested in accordance with ISO 6925 and PREN ISO 9239-1.

2.8.3.1 Auxiliary Car Lighting

Provide automatic, battery powered, auxiliary lighting. Auxiliary lighting system must consist of a minimum of two lamps with a minimum illumination of (2.2 lux). The power supply must have the capacity to maintain this level of illumination, at the Car Operating Panel, for a minimum of four hours.

2.8.3.2 Auxiliary Car Power

Provide automatic alarm and communication auxiliary power system. This emergency power system must be capable of providing for the operation of the audible signaling device (emergency alarm) for a minimum of one hour and the means of two-way communication for a minimum of four hours.

2.8.3.3 Top of Car Emergency Exit

Top of Car Emergency Exit must provide unrestricted access from top of car areas into the interior of the elevator cab. Emergency exit must provide a locking device, releasable by hand from on top of car and operable only by the standard elevator triangle key within the cab.

2.8.3.4 Car Entrance Sill

Provide one piece cast white bronze or nickel silver entrance sill. Set sills level and flush with floor finish. Use same material for hoistway and car entrance sills.

2.9 PASSENGER ELEVATOR HOISTWAY DOORS AND ENTRANCES

EN 81-2, PREN 81-8, and UNI 9723.

2.9.1 Door Assembly Rating

Provide hoistway entrance assemblies which have a minimum 2 hour fire rating, as tested in accordance with PREN 81-8. Each assembly must have a permanent label visible after installation.

2.9.2 Hoistway Door Closing Force

The maximum door closing force and the maximum kinetic energy generated by power operated, horizontally sliding, car gates and hoistway doors are as follows:

2.9.2.1 Maximum Door Closing Force

133 N.

2.9.2.2 Maximum Kinetic Energy

- a. Doors w/an operational door-reopening device 9.49J.
- b. Doors w/out an operational door-reopening device 3.39J.

2.9.3 Hoistway Entrance Frames

NOTE: Coordinate materials with paragraph "ELEVATOR DESCRIPTION".

1.8 mm thick 14 gage [stainless steel] [or] [prefinished carbon sheet steel]. Solidly grout uprights of entrances to height of 1500 mm 5 feet.

2.9.4 Hoistway Entrance Sills

Provide one-piece cast white bronze or nickel silver entrance sills. After sill is set level and flush with finished floor height, solidly grout under full length of sill. Provide hoistway entrance sill and car entrance sill of the same material.

2.9.5 Hoistway Entrance Doors

Hollow metal non-vision construction with flush surfaces on car and landing sides.

2.9.6 Entrance Fascias

Provide sheet metal hoistway facia. Landing sill guards and hoistway facia must be provided at terminal landings and from the sill of each landing to the dust cover at the landing below. Top landing dust cover and bottom landing sill guard must extend back to the wall of the hoistway.

Provide sheet metal hoistway door track dust covers at each landing. Dust covers must cover door locks and door roller tracks and extend the full width of the door track and associated hardware.

**NOTE: Hoistway ventilation required for all
elevators of 3 stops or more or 2 stop with travel
greater than 4876 mm.**

2.9.7 Hoistway Ventilation

Provide hoistway ventilation directly to outside air by fixed louver through side wall of hoistway at highest possible point in hoistway. The minimum free area of the louvered opening shall be equal to at least 3 1/2 percent of cross sectional area of hoistway.

[2.10 FREIGHT ELEVATOR GUIDE, PLATFORM, AND ENCLOSURE

**NOTE: Include PREN 81-11 for new freight elevators
in existing buildings.**

EN 81-2 [,PREN 81-11].

2.10.1 Roller Guides

Provide roller guide assemblies in adjustable mounting on each side of car in accurate alignment at top and bottom of car frame.

2.10.2 Car Frame and Platform

Provide car frame, platform members and their connections to withstand the static and dynamic forces imposed on the freight elevator by maximum loading.

2.10.3 Car Enclosure

**NOTE: Use two-section car gate if headroom is
insufficient for single section.**

Complete with [two-section] [vertical rising] gate, power gate operator, emergency exit, emergency light, and lighting fixtures. Paint interior and exposed surfaces with manufacturer's standard finish. Provide certificate frame and recessed car station.

2.10.3.1 Top of Car Emergency Exit

Top of Car Emergency Exit must provide unrestricted access from top of car area into the interior of the elevator cab. Emergency exit must provide a locking device.

2.11 FREIGHT ELEVATOR HOISTWAY DOORS AND ENTRANCES

NOTE: If hoistway doors are for exterior uses, weather stripping does not provide practical protection. In lieu of weatherstripping, incorporate alcoves to protect edges and bottom surfaces of exterior doors from rain, snow, and ice.

NOTE: Include PREN 81-11 for new freight elevators in existing buildings.

EN 81-2 [,PREN 81-11]. Provide hoistway entrance with complete door assembly including door panels with truckable sill, frames, guide rails, and accessories. Provide hoistway entrance assemblies which have a minimum 2 hour fire rating in accordance with PREN 81-8. Each assembly must have a permanent label visible after installation.

2.11.1 Door Panel

Fire rated door panel, with minimum 100 mm wide by 225 mm high vision panel at upper door section.

2.11.2 Door Operation

NOTE: Use semi-selective if only one opening at any floor; full-selective if two openings at any floor.

[Semi-selective] [Full-selective].

2.11.3 Hoistway Door Interlocks

CEI 64-8, CEI 20-25, UNEL Table 73659 and Section 16402, "Interior Distribution System." Suspend traveling cables by means of self-tightening webbed devices. The conductors from the hoistway riser to the hoistway door interlocks shall be flame retardant and suitable for a temperature of not less than 200 degrees (C).

2.11.4 Entrance Fascias

Provide sheet metal hoistway fascia. Landing sill guards and hoistway fascia must be provided at terminal landings and from the sill of each landing to the dust cover at the landing below. Top landing dust cover and bottom landing sill guard must extend back to the wall of the hoistway.

Provide sheet metal hoistway door track dust covers at each landing. Dust covers must cover door locks and door roller tracks and extend the full width of the door track and associated hardware.

]2.12 PROVISION FOR HANDICAPPED AND MEDICAL SERVICES ACCESS

NOTE: Provide all elevators of size to accommodate handicapped access as a minimum. For all buildings of four stories or more in height, provide at least one elevator of size to accommodate emergency medical access by a medical gurney.

2.13.1 Provisions for Handicapped

UFAS and D.P.R. No. 236 and as stated here in.

2.12.1 Hoistway Door Frames

Provide raised and Braille floor designations on both jambs of elevator hoistway entrance frames. The centerline of the characters shall be 1525 mm above finish floor. Such characters shall be 50 mm high. Permanently apply plates to the jambs.

2.12.2 Door and Signal Timing for Hall Calls

Elevator doors shall open and close automatically. Provide reopening device that will stop and reopen a car door and hoistway door automatically if the door becomes obstructed. Door reopening devices shall remain effective for at least 20 seconds.

2.12.3 Notification Call

The minimum acceptable notification that a car is answering a call until the doors start to close is 5 seconds.

2.12.4 Door Delay for Car Call

The minimum time for elevator doors to remain fully open in response to a car call shall be 3 seconds.

2.12.5 Elevator Control Panel

Provide passenger controls as follows:

a. Buttons

(1) Provide all control buttons at least 19 mm in their smallest dimension.

(2) Tactile, Braille, and Visual Control Indicators. All control buttons shall be designated by Braille and by raised standard alphabet characters for letters, Arabic characters and for numerals. The call button for the main entry floor shall be designated by a raised star at the left of the floor designation. All raised designations for control buttons shall be placed immediately to the left of the button to which they apply. Applied plates, permanently attached, are an acceptable means to

provide raised control designations. Floor buttons shall be provided with visual indicators to show when each call is registered. The visual indicators shall be extinguished when each call is answered.

(3) Height. All floor buttons shall be no higher than 1370 mm above the finish floor for wheelchair side approach and 1220 mm for wheelchair front approach. Emergency controls, including the emergency alarm and emergency stop, shall be grouped at the bottom of the panel and shall have their centerline no less than 890 mm above the finish floor.

2.12.6 Provisions for Emergency Medical Services

In buildings four stories in height or more, provide at least one elevator for emergency medical service access to all floors. Provide this elevator in a size and arrangement to accommodate a 24-inch by 76-inch (610 mm by 1930 mm) ambulance stretcher in the horizontal, open position and shall be identified by the international symbol for Emergency Medical Services (Star of Life). The symbol shall not be less than 3 inches (76 mm) high and shall be placed inside on both sides of the hoistway door frame.

2.13 POWER SUPPLY

All items including, but not limited to, devices, outlets, boxes and fitting shall be, as a minimum, sized in accordance with the Italian Electrotechnical Commission (CEI) unless indicated or specified otherwise. Further, each item shall meet the requirements of these specifications and of the publications reference herein. All items shall be new, unless specified or indicated otherwise. Provide material and equipment with the European Mark of Quality (CE) in accordance with DLGS 626/96.

2.13.1 Elevator Main Supply Disconnect

Provide a fused disconnect switch for each individual elevator's main power, capable of being locked in the open position, serving the main power and control for their respective elevator. Each disconnect switch shall be served by shunt trip breaker in the appropriate electrical panel. Shunt trip breaker shall be operated by the sprinkler flow switch(s) to automatically open the power supply. Power shall be restored manually.

2.13.2 Lights, Receptacles and Ventilation Power Supply Disconnect

Provide a branch circuit separate from the main elevator power supply, with a fused disconnect switch capable of being locked in the open position, for lights, receptacles, and ventilation for each individual elevator car.

2.13.3 Receptacles

All receptacles on the car, in the car, in the hoistway pit and in the machine room must be GFI protected. Provide a twist lock simplex receptacle with matching plug without GFI protection to supply power to the permanently installed sump pump.

[2.14 EMERGENCY POWER OPERATION

**NOTE: Use in hospitals and buildings in which
sufficient standby power is provided to operate one
or more elevators.**

Upon outage of normal power and initiation of emergency power, provide circuitry and wiring to operate elevator [telephone] [and] [intercom] to accomplish operation sequences. [In multiple elevator system, one elevator travels automatically to the main floor, opens doors, and shuts down. Thereafter, each other elevator in group, one at a time returns automatically to main floor. After all cars have returned to main floor, provide automatically one [passenger] [freight] car in regular service.] [For single elevator system, elevator travels automatically to main floor, opens doors, and automatically places itself in regular service.] During emergency power operation, provide a sign reading "EMERGENCY POWER" flashing in each car station. [At the same time, provide operable Firefighters' Service.]

]2.15 PROVISIONS FOR EARTHQUAKE PROTECTION

**NOTE: Provide seismic protection as . Provide
fastenings, attachments, and restraints for
prevention of seismic damage in detail by registered
structural engineer with his seal applied to
drawings or sketches.**

Provide seismic design in accordance with the specified requirements.

2.15.1 Guide Rails, Guide Rail Brackets and Supports

Provide a minimum guide rail size of 6.8 kilograms per 304.8 mm. Provide a minimum guide rail bracket and supports spacing of 2438 mm

2.15.2 Fastening and Stresses

Guide rail brackets, their fastenings and supports, such as building beams and walls, shall be capable of withstanding the horizontal forces imposed by the seismic loads with a total deflection at the point of support not to exceed 6.4 mm. Fastenings subject to impact loads shall be designed to withstand forces double those required for rigid fastenings. Maximum combined stresses in fastenings and their parts due to the specified seismic forces shall not exceed 88% of the yield strength of the material used.

2.15.3 Pipe Support

Piping supports to restrain transverse motion shall be provided near changes in direction and particularly near valves and joints. Horizontal spans shall be supported at intervals not to exceed 1830 mm horizontally.

- a. Spacing is based on a natural frequency limit of 20 Hz. The pipe is presumed to have oil in it and, for an added margin of safety, the oil is assumed to weigh 897 kg/m^3 at 15.6°C .
- b. Maximum combined bending and shear stress is limited to 71.8 kPa.
- c. Maximum sag at the center of the span is limited to 2.54 mm.

2.15.4 Support of Tanks

Means shall be provided which shall prevent the tank from being overturned or displaced from seismic load.

PART 3 EXECUTION

3.1 INSTALLATION

NOTE: Include EN 81-11 for non elevators in existing building.

Install in accordance with manufacturer's instructions, EN 81-2[, PREN 81-11], and CEI 64-8.

3.1.1 Traveling Cables

Do not allow abrupt bending of traveling cables.

3.1.2 Automatic Shutoff Valve

Locate in supply-return line, as close as possible to cylinder-plunger unit.

3.1.3 Structural Members

Do not cut or alter. Restore any damaged or defaced work to original condition.

3.1.4 Safety Guards

Selector cables or tapes exposed to possibility of accidental contact in machine room shall be completely enclosed with 1.5 mm thick 16 gage sheet metal or expanded metal guards, both horizontally and vertically. Exposed gears, sprockets, and selector drums shall be guarded from accidental contact.

3.1.5 Miscellaneous Requirements

Include recesses, cutouts, slots, holes, patching, grouting, and refinishing to accommodate elevator installation. Use core drilling to drill all new holes in concrete. Finish work to be straight, level, and plumb. During installation, protect machinery and equipment from dirt, water, or mechanical damage. At completion, clean all work, and spot paint.

3.1.6 Firefighters' Service

Firefighters' Service shall be complete including installation and wiring of all smoke detectors. Coordinate smoke detector installation for Firefighters' Service.

3.2 FIELD QUALITY CONTROL

After completing elevators system installation, notify Contracting Officer that elevator system is ready for final inspection and acceptance test. Contracting Officer will obtain services of Naval Facilities Engineering Command certified elevator inspector.

Contractor shall perform all required tests and demonstrate proper operation of each elevator system and prove that each system complies with contract requirements and EN 81-2 [,PREN 81-11]. Inspection procedures in EN 81-2 [,PREN 81-11] form a part of this inspection and acceptance testing. All testing and inspections shall be conducted in the presence of the elevator inspector. Demonstrate the proper operation of all equipment at various date settings, selected by the elevator inspector, ranging from the date of contract award through 1 January 2099.

Inspector shall complete, sign and post form NAVFACENGCOM 9-11014/23 (Rev. 7-88), Elevator Inspection Certificate, after successful completion of inspection and testing.

3.2.1 Testing Materials and Instruments

Furnish testing materials and instruments required for final inspection. Include calibrated test weights, tachometer, 600-volt megohm meter, volt meter and ammeter, three Celsius calibrated thermometers, door pressure gage, spirit level, stop watch, hydraulic pressure test gauge, and a 30 metertape measure.

3.2.2 Field Tests

3.2.2.1 Endurance Tests

Test each elevator for a period of one hour continuous run, with specified rated load in the car. Restart the one hour test period from beginning, following any shutdown or failure. During the test run, stop car at each floor in both directions of travel for standing period of 10 seconds per floor. The requirements for Rated Speed, Leveling, Temperature Rise, and Motor Amperes testing specified herein shall be met throughout the duration of the Endurance test.

3.2.2.2 Automatic Shutoff Valve Tests

Test the automatic shutoff valve twice. Once at beginning of acceptance test and again at conclusion of one-hour Endurance test to ensure consistent performance of shutoff valve, regardless of temperature of equipment and oil.

3.2.2.3 Speed Tests

Determine actual speed of each elevator in both directions with rated load and with no load in elevator car. Make Speed tests before and immediately after Endurance test. Determine speed by tachometer reading,, excluding accelerating and slow-down zones. Minimum acceptable speed is the Rated Speed as specified. Maximum acceptable elevator speed is 110 percent of Rated Speed. The maximum load on car platform during loading or unloading shall not exceed 150 percent of rated load.

3.2.2.4 Leveling Tests

Test elevator car leveling devices for landing accuracy of plus or minus 6 mm at each floor with no load in car, symmetrical load in car, and with rated load in car in both directions of travel. Determine accuracy of floor landing both before and immediately after endurance tests. The maximum load on car platform during loading or unloading shall not exceed 150 percent of rated load.

3.2.2.5 Pressure Tests

Check operating pressure at pump and cylinder head under no load and rated load. Test pressure at which relief valve operates.

3.2.2.6 Insulation Resistance Tests

Perform tests to ensure wiring systems free from short circuits and grounds. Minimum acceptable insulation resistance for electrical conductors is one megohm between each conductor and ground and between each conductor and other conductors. Prior to megohm meter test, make provision to prevent damage to the electronic devices.

3.2.2.7 Temperature Rise Tests

Determine the temperature rise of the hydraulic pump motor during the full load test run for a minimum of one hour. Under these conditions, maximum acceptable temperature rise shall not exceed the acceptable temperature rise indicated on the manufacturer's data plate. Start test only when equipment is within 5 degrees C of ambient temperature.

3.2.2.8 Motor Ampere Tests

Measure and record motor amperage when motor is running and elevator is lifting at rated load and speed. Measure and record motor amperage at beginning and end of Endurance test.

[3.3 Maintenance Service Training

**NOTE: Specify elevator maintenance service
instructions for project at isolate locations.**

Provide a qualified representative of the elevator manufacturer to instruct Government personnel in care, adjustment, and maintenance of elevator equipment for a period of not less than 5 working days immediately following acceptance of system.]

NOTE: Suggestions for improvement of this specification will be welcomed using the Navy "Change Request Forms" subdirectory located in SPECSINTACT in Jobs or Masters under "Forms/Documents" directory or DD Form 1426. Suggestions should be forwarded to:

Officer In Charge
Seabee Logistics Center
NAVFAC 15G/SLC 46
4111 San Pedro Street
Port Hueneme, CA 93043-4410

FAX: (805) 985-6465/982-5196 or DSN 551-5196

-- End of Section --